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# *Massonia visseriae* (Asparagaceae, Scilloideae): rediscovery of a neglected species of *Neobakeria* and its transfer to *Massonia*

MARIO MARTÍNEZ-AZORÍN[1*], MICHAEL PINTER[2], MANUEL B. CRESPO[1], MARÍA ÁNGELES ALONSO-VARGAS[1] & WOLFGANG WETSCHNIG[2]

[1] *dCARN (Depto. Ciencias Ambientales y Recursos Naturales) & CIBIO (Instituto Universitario de la Biodiversidad), Universidad de Alicante, P. O. Box 99, E-03080 Alicante, Spain. e-mail: mmartinez@ua.es*
[2] *Institute of Plant Sciences, NAWI Graz, Karl-Franzens-University Graz, Holteigasse 6, A-8010, Graz, Austria.*
**author for correspondence*

Asparagaceae subfamily Scilloideae, tribe Hyacintheae is alternatively regarded as Hyacinthaceae subfam. Hyacinthoideae. Additional information on generic circumscriptions in Hyacinthoideae can be found in Martínez-Azorín *et al.* (2013, 2014a, 2014b), Pinter *et al*. (2013) and Wetschnig *et al.* (2014).

The genus *Massonia* Houttuyn (1780: 424) belongs to tribe Massonieae of Hyacinthoideae (Speta 1998a, 1998b, Wetschnig *et al.* 2002, Pfosser *et al.* 2003, Manning *et al.* 2004) confined to South Africa and southwestern Namibia. Our studies in *Massonia* reveal that the taxonomy of the genus, as presented in recent revisions, is not satisfactory and several species concepts have been either overlooked or misunderstood (Wetschnig *et al.* 2012, 2014, Martínez-Azorín *et al.* 2013, 2014a, 2014b, 2015a, 2015b, 2017, Pinter *et al.* 2013, 2015).

*Neobakeria* Schlechter (1924: 149) was characterized as having uniseriate filaments which are distinctly connate above the perigone, and included 7 species placed by Baker in *Polyxena* Kunth (1843: 294) subgenus *Astemma* Baker (1897: 419) such as *Neobakeria angustifolia* (Linnaeus 1782: 193) Schlechter (1924: 150); *N. burchellii* (Baker 1897: 420) Schlechter (1924: 150); *N. comata* (Baker 1897: 419) Schlechter (1924: 150); *N. haemanthoides* (Baker 1888: 1727) Schlechter (1924: 150); *N. marginata* (Baker 1897: 420) Schlechter (1924: 150); *N. namaquensis* Schlechter (1924: 150) and *N. rugulosa* (Baker 1897: 420) Schlechter (1924: 150), *N. namaquensis* being the type (Müller-Doblies & Müller-Doblies 1997). Two additional species were later described in this genus, as *Neobakeria heterandra* Isaac (1939: 729) and *N. visseriae* Barnes (1933: 72).

All *Neobakeria* species are currently placed in *Massonia* or in *Daubenya* Lindley (1835: t. 1813), except *Neobakeria visseriae*. Schlechter (1924) related his new genus *Neobakeria* to *Polyxena* and *Massonia*, but he differenced *Polyxena* by the biseriate and almost free filaments above the perigone and *Massonia* by the uniseriate filaments only shortly connate above perigone (Schlechter 1924). The generic circumscription within tribe Massonieae has strongly changed in the last decades (Müller-Doblies & Müller-Doblies 1997, Manning & van der Merwe 2002), but at present it seems to exist a consensus on placing the *Neobakeria* species in *Massonia* or *Daubenya* depending on their bulb, leaves, inflorescence, and bract morphology (Manning & van der Merwe 2002). Our ongoing taxonomic and phylogenetic studies revealed that *Massonia* includes species with nearly free filaments above the perigone to distinctly connate to form a filaments tube, not supporting recognition of Schlechter's *Neobakeria*.

*Neobakeria visseriae* was described from plants collected "on a Klip Koppie about 5 miles from Lambert's Bay" by H.A. Visser in May 1931. The protologue describes the plants as having dark green leaves with longitudinal striation and elongated pustules that bear fascicles of white trichomes; flowers white with a cylindrical perigone tube, not expanded at the apex; filaments ca. 6 mm long and connate to form a tube ca. 1.5 mm long above the perigone; and a pale green ovary with a cylindrical style shorter than the stamens. The holotype is kept at BOL and includes 5−6 plants, 4 of them in flower, and a detailed drawing of the plant, made by P.E. Barnes. Both the pressed plants and the drawing perfectly agree with the protologue, however we can highlight some further additional characters from the illustration, such as the free perigone segments being spreading, but neither strongly reflexed nor with a sigmoid inrolled curve, and the fascicles of unequal trichomes on elongated leaf emergences. Furthermore, although the illustration shows filaments of similar length, the flowers inside the envelope in the holotype specimen show unequal filaments and blue anthers with blue pollen.

After several failed trials to find this species in nature around Lambert's Bay, we found one population of *Massonia visseriae* at the type locality, on a Klip Koppie near Jakkalsrivier ca. 6 km E of Lambert's Bay between Van Putensvlei and Groendam farms. Our phylogenetic analyses (not shown) confirm the inclusion of this species in *Massonia*, also supported

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by morphology. Therefore, we propose a new combination in *Massonia* for *Neobakeria visseriae*. A complete morphological description is presented below based on the study of living material, and comments on its ecology and distribution are reported.

## Materials and Methods

Detailed morphological studies of *Massonia* were undertaken on natural populations, cultivated specimens and herbarium vouchers, as elaborated upon in Martínez-Azorín *et al.* (2007, 2009). Herbarium specimens from the herbaria ABH, B, BLFU, BM, BOL, E, G, GZU, GRA, HAL, K, L, LINN, M, MO, NBG, NU, NY, P, PRE, S, TCD, UPS, W, WU, Z, ZSS, and ZT (acronyms according to Thiers 2017) were studied. Orthography of geographical names and grid-number system follow Leistner & Morris (1976).

## A new combination in *Massonia*

***Massonia visseriae*** (P.E.Barnes) Mart.-Azorín, M.Pinter, M.B.Crespo, M.A.Alonso & Wetschnig ***comb. nov.***

Basionym:—*Neobakeria visseriae* Barnes (1933: 72). Fig. 1.

**Type**:—SOUTH AFRICA. Western Cape. Clanwilliam (3218): On a Klip Koppie ca. 5 miles from Lambert's Bay, Clanwilliam Div. (-AB), May 1931 [in flower], *H.A. Visser sub BOL19616* (holotype BOL140472!, available at http://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.bol140472). Note:—A herbarium collection at Kew (K000257133) is identified in pencil as isotype of *Neobakeria visseriae*. It was collected near Lambert's Bay by Visser sub BOL19616, and Visser wrote in the label that leaves are minutely scabrous, what would fit in general terms with the protologue of *N. visseriae*. The study of this collection, however, evidences the necessity to exclude it from the type material of *N. visseriae*, as the collection was named by Visser herself as "*Massonia latifolia*?" and was collected in July 1932. Furthermore, the plant in the voucher shows a much larger size and some floral characters not fitting the protologue, it indeed belonging to the *Massonia depressa* aggregate. Therefore, the collection at Kew should be disregarded as original material.

**Description based on living material**:—Deciduous geophyte. Bulb ovoid to subglobose, 1.5−3 × 1−3.5 cm, with white, fleshy bulb scales covered by pale brown, papery outer tunics. Leaves 2, synanthous, opposite, appressed to the ground, ovoid to lanceolate, longitudinally striate, with a very short apicule at the apex, limb 3−14 × 2.5−8 cm, with narrow, membranous, minutely papillose margins; adaxial side green, with 0−50 elongated emergences per $cm^2$, up to 2 mm in length, with fascicles of unequally elongated and narrowly conical trichomes, 0.2−1 mm long; abaxial side smooth, green; petiole 1−5 cm long. Inflorescence a dense, subcapitate raceme, up to 2−4 cm long with up to 50 flowers, shortly overtopping ground level. Bracts narrowly obovate-lanceolate, attenuate at the apex, 12−14 × 3−5 mm, green in the upper half with white entire membranous margins and base, glabrous, minutely papillate on margins. Pedicels at anthesis 10−13 mm long. Flowers pentacyclic, trimerous. Perigone long and narrowly tubular, not distinctly widening at the end of the tube formed by 6 white tepals; free segments 6−7 × 1−1.5 mm, entire, white, straight and erect in bud, spreading to slightly reflexed at anthesis, neither inrolled nor with a distinct sigmoid curve at the base; perigone-filaments tube 14−17 × 1.5−2 mm, narrowly cylindrical, not widening in the upper portion, with the mouth showing strongly convex sides, giving the appearance of having 6 gibbosities, the ovary deeply included in the tube. Stamens 6. Filaments white, long-attenuate, 9−12 mm long, spreading at anthesis and unequal in length, the outers being longer, distinctly connate at the base for 2−3 mm above the perigone segments; anthers oblong, dark blue, 1.2−1.6 × 0.4−0.6 mm when closed, dorsifixed, with blue pollen. Gynoecium tricapelar, syncarpic, obclavate. Ovary conical to suboblong, pale green to yellow, 3−4 × 1−1.2 mm, gradually tapering to the style. Style white, gradually tapering into the apex, erect, 12−17 mm long at anthesis. Capsule ovate in lateral view, trigonous with blunt edges in apical view, ca. 6−8 × 4−6 mm. Seeds globose, black, ca. 1.8 × 1.5 mm, smooth.

**Eponymy**:—The specific epithet (*visseriae*) honours the collector of the type material, Miss H.A. Visser.

**Phenology**:—*Massonia visseriae* mostly flowers in May and June in the wild.

**Habitat**:—*Massonia visseriae* is found in rock pockets with shallow sandy soil in rocky outcrops; the surrounding vegetation is classified as Leipoldtville Sand Fynbos (FFd2); the region is characterised by winter rainfall peaking from May to August, with a mean annual precipitation of 260 mm and 3−4 days of frost per year (Mucina & Rutherford 2006).

**Distribution**:—This species is known to us only from a single population in the surroundings of Lambert's Bay. Although it seems to be a rare species, only collected twice after the original description, further studies are needed to evaluate its conservation status and distribution.


**FIGURE 1.** *Massonia visseriae* (P.E.Barnes) Mart.-Azorín *et al.* in habitat E of Lambert's Bay (type locality) on 23 July 2016 (A, B) and in cultivation from the type locality grown at the University of Alicante on 25 October 2017 (C–G). A. Plant in fruit showing longitudinally striate leaves with elongated pustules with trichomes; B. Plants with smooth and pustulate leaves cooccuring; C. Elongated emergences with trichomes of different lengths; D. Inflorescence, lateral view; E. Inflorescence, apical view; F. Flowers, lateral view; G. Dissected flowers, lateral view. Scale bars, C: 0.5 mm; D–G: 1 cm.

**Taxonomic relationships**:—*Massonia visseriae* shows a combination of morphological characters that facilitates its recognition as a distinct species. The leaves with elongated pustules bearing fascicles of unequal trichomes (sometimes plants with smooth glabrous leaves occur in the same population); the flowers with narrowly cylindrical perigone-filaments tube, not widening at the apex and with six gibbosities at the mouth of the tube; the spreading perigone segments; the unequal filaments that are distinctly connate above the perigone; the blue anthers and pollen; and the obclavate gynoecium with the style shortly overtopping the perigone filaments-tube, allow clear distinction of the species.

*Massonia heterandra* (Isaac 1939: 729) Jessop (1976: 426) resembles *M. visseriae* regarding the unequal length of the stamens and the pustulate leaves, but the former differs by the isodiametric emergences with short trichomes on top, perigone-filaments tube only about 8 mm long, the filaments connate above the perigone for less than 1 mm, the style clearly exceeding the perigone-filaments tube and the usually pinkish colour of flowers and gynoecium, among other characters. Furthermore, *M. heterandra* occurs at high elevations in the SW Cape Mountains.

*Massonia pseudoechinata* Mart.-Azorín, M.Pinter & Wetschnig in Martínez-Azorín *et al.* (2015b: 124) differs from *M. visseriae* by the leaves with scarce to numerous small isodiametric emergences with a declinate, smooth trichome; larger bracts; longer flower pedicels; flowers with strongly reflexed and inrolled perigone segments bearing a distinct sigmoid curve at the base; filaments shortly connate above perigone; and larger capsules (Martínez-Azorín *et al.* 2015b). Other species such as *M. bakeriana* Pinter *et al.* (2015: 52), *M. dentata* Martínez-Azorín *et al.* (2014a: 203), *M. roggeveldensis* Mart.-Azorín *et al.* (2015b: 122), or *M. tenella* Sol. ex Baker (1870: 389) differ from *M. visseriae* by a distinct combination of characters (Baker 1870; Pinter *et al.* 2015; Martínez-Azorín *et al.* 2014a, 2015b).

**Additional specimens studied**:—SOUTH AFRICA. Western Cape. Clanwilliam (3218): Lambert's Bay (-AB), Clanwilliam C.P., 13 May 1963, *H. Hall s.n.* (NBG76417!); Clanwilliam (3218): ca. 4.5 km E of Lambert's Bay, on gravel road to Vredendal (-AB), 32 m elev., shallow sandy soils on rock ledges and crevices, 23 July 2016, *M. Martínez-Azorín, M.B. Crespo, M.A. Alonso, J.L. Villar, A. Vicente, J. Moreno & A. Terrones MMA1480* (ABH74263!, GRA!).

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